INERTIAL CONFINEMENT FUSION

Lawrence Livermore National Laboratory

Monthly Highlights

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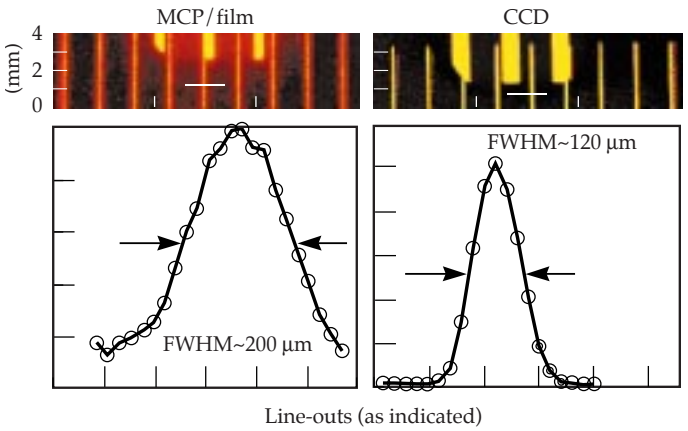
NIF Steel Framework up. The steel framework of the NIF is virtually complete. In recognition of this, the steel erection contractor Nelson Dillingham hosted the "topping out" ceremony, including a luncheon for over 225 workers and the placing of an American flag on top of the structure. More steel will be needed after installation of equipment into the laser bays. About 5,100 tons of structural steel have been used, and, by completion, the structure will contain 7,600 tons of rebar.

View of NIF construction looking east.

X-Ray Streak Cameras without Intensifiers. A prototype of the next-generation x-ray streak camera for use on Nova and ultimately on the NIF has been developed and tested. The device is comprised of a generic high-magnification commercial streak camera tube and cooled CCD. Streak camera electrons bombard the CCD, producing as many as 3,500 secondary electrons, which are easily detectable. First experimental results show significantly improved spatial resolution (see figure), better signal-to-noise ratio, and higher dynamic range.

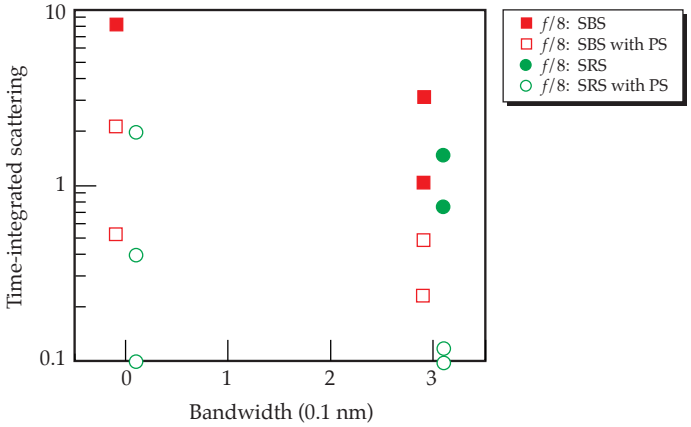


The FWHM decrease (right) shows improved spatial resolution.

PAM Prototype Meets NIF Energy Requirement. A fully integrated NIF preamplifier module (PAM) prototype has exceeded NIF output-energy requirements. We extracted 29 J from the multipass amplifier, exceeding the 22-J requirement. We are now diagnosing the PAM output wavefront and beam quality with a high-resolution diagnostic package. The PAM prototype is packaged as a NIF line-replaceable unit.

A mechanical technician adjusts spatial-filter telescopes in the PAM prototype.

NIF-Like Beam Smoothing Experiments. Recent Nova experiments showed that NIF-like smoothing by spectral dispersion (SSD) reduces scattering losses from gas-filled hohlraums. Stimulated Brillouin scattering (SBS) levels, shown below, are reduced when 0.3 nm of bandwidth using a 17-GHz modulator is added to an $f/8$ beam. Qualitatively similar results have been obtained with a lower-frequency modulator. A beam with the higher-frequency modulator more easily propogates through the NIF laser. Polarization smoothing (PS), first developed at the University of Rochester, further reduces the scattering levels, showing that it may provide more margin for NIF target performance.



SBS and SRS scattering from gas-filled hohlraums.

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